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Title: Transportation Surveys

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Transportation Surveys

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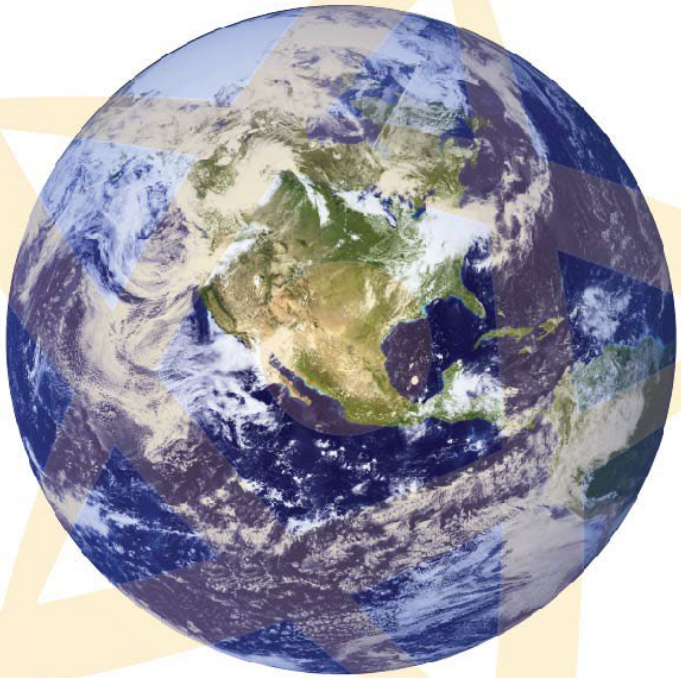

OFF-SITE SOURCE RECOVERY PROGRAM
NATIONAL SECURITY THROUGH SOURCE REMOVAL

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Terminal Objective

- Safety First - Source Handling
- Using Regulations for the Safe Transport of Radioactive Material , 2018 Edition, Specific Safety Requirements, No. SSR-6 (Rev. 1) Understand Transportation Surveys
  - Pre-Transportation Survey
  - Package Survey
  - Vehicle Survey
  - Post Transport Survey

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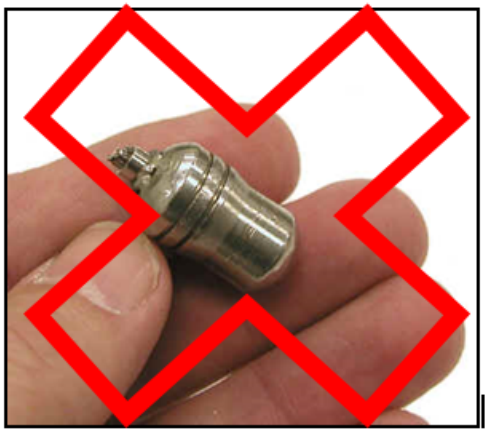
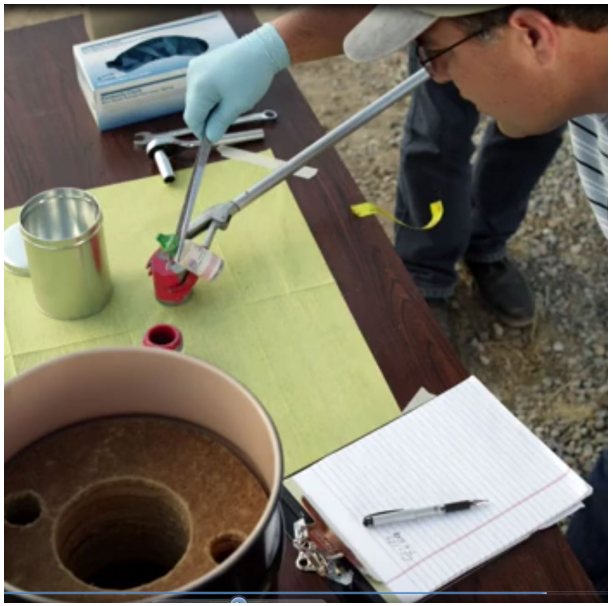
Safety First - Source Handling

- Source Handling
  - Never handle a bare source with your hands
  - Always use long handled tools
  - Minimize Time
  - Maximize Distance
  - Use Shielding
- Know the Dose Rate
  - Helps you plan stay time.





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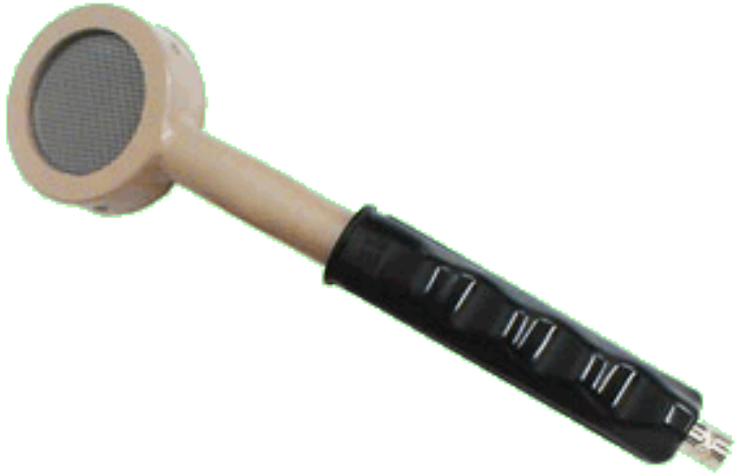
Safety First - Source Handling

- You must always treat a source as contaminated until you prove otherwise.
  - Use appropriate detectors to screen samples for removable contamination, both alpha and beta.
  - Wear the proper personal protective equipment.
- Knowing the dose rate is important to stay within your whole body and extremity dose limits.
  - Use dosimetry to keep record of your radiation exposures
- Use long handled tools when handling bare sealed sources and utilize appropriate shielding.
- **Practicing dose minimization principles is everyone's responsibility, As Low as Reasonably Achievable (ALARA)**

Radiological Surveys

- Characterize the radiological environment:
  - Radiation dose rates
  - Types of radiations
    - Always check gamma, then others if suspected (Alpha, beta, neutron)
  - Contamination levels
  - Types of contamination
    - Surface or airborne
    - Alpha, beta, gamma



Radiation Surveys

- 248. ***Vehicle*** shall mean a road *vehicle* (including an articulated *vehicle*, i.e. a tractor and semi-trailer combination), railroad car or railway wagon. Each trailer shall be considered as a separate *vehicle*.
- Pre-Transportation Survey of Vehicle
  - As a good management practice, survey the vehicle prior to loading any packages are placed on to the vehicle to ensure vehicle is not contaminated.
    - Direct: only in low background radiation (Include cab where the drivers are sitting)
    - Indirect: take swipe of surface where packages are to be loaded and count it in a low background area

Radiation Surveys

- 231. ***Package*** shall mean the complete product of the packing operation, consisting of the *packaging* and its contents prepared for transport. The types of *package* covered by these Regulations that are subject to the activity limits and material restrictions of Section IV and meet the corresponding requirements are:
  - (a) *Excepted package*;
  - (b) *Industrial package Type 1 (Type IP-1)*;
  - (c) *Industrial package Type 2 (Type IP-2)*;
  - (d) *Industrial package Type 3 (Type IP-3)*;
  - (e) *Type A package*;
  - (f) *Type B(U) package*;
  - (g) *Type B(M) package*;
  - (h) *Type C package*.

Radiation Surveys

- 230. ***Overpack*** shall mean an enclosure used by a single *consignor* to contain one or more *packages,* and to form one unit for convenience of handling and stowage during transport.
- 223. ***Freight container*** shall mean an article of transport equipment that is of a permanent character and is strong enough to be suitable for repeated use; specially designed to facilitate the transport of goods by one or other modes of transport without intermediate reloading, designed to be secured and/or readily handled, and having fittings for these purposes. The term *freight container* does not include the *vehicle*.

Radiation Surveys

Package Radiation Survey

- 244. *Transport index* (*TI*) assigned to a *package*, *overpack* or *freight container*, … , shall mean a number that is used to provide control over radiation exposure.
- 529(b) The TI shall be determined following the procedures specified in paras 523, 524 and 524A
- For source shipments, use 524(a).
  - Direct: Dose rate on **contact** of the package and **at 1 meter** from the package
  - Indirect: take swipe of surface of the package and count it in a low background area

Radiation Surveys

Package Radiation Survey

- 529. *Packages*, *overpacks* and *freight containers* shall be assigned to either category I-WHITE, II-YELLOW or III-YELLOW in accordance with the conditions specified in Table 8 and with the following requirements:
  - (a) For a *package*, *overpack* or *freight container*, the ***TI*** and the **surface *dose rate*** conditions shall be taken into account in determining which category is appropriate. Where the *TI* satisfies the condition for one category but the surface *dose rate* satisfies the condition for a different category, the *package*, *overpack* or *freight container* shall be assigned to the higher category. For this purpose, category I-WHITE shall be regarded as the lowest category.

Radiation Surveys

Package Radiation Survey

- 526. Except for *consignments* under *exclusive use*, the *TI* of any *package* or *overpack* shall not exceed 10, ….
- 221. *Exclusive use* shall mean the sole use, by a single *consignor*, of a *conveyance* or of a *large freight container*, in respect of which all initial, intermediate and final loading and unloading and *shipment* are carried out in accordance with the directions of the *consignor* or *consignee*, where so required by these Regulations.
- 528. The maximum *dose rate* at any point on the external surface of a *package* or *overpack* under *exclusive use* shall not exceed 10 mSv/h.

Radiation Surveys

Transport Vehicle Radiation Survey

- 566. Loading of *freight containers* and accumulation of *packages*, *overpacks* and *freight containers* shall be controlled as follows:
  - (b) The *dose rate* under routine conditions of transport shall not exceed 2 mSv/h at any point on the external surface of the *vehicle* or *freight container*, and 0.1 mSv/h at 2 m from the external surface of the *vehicle* or *freight container*, except for *consignments* transported under *exclusive use* by road or rail for which the radiation limits around the *vehicle* are set forth in para. 573(b) and 573(c).

Radiation Surveys

- Transport Vehicle Radiation Survey - *Exclusive use*
- 573. For *consignments* under *exclusive use*, the *dose rate* shall not exceed:
  - (a) 10 mSv/h at any point on the external surface of any *package* or *overpack*, and may only exceed 2 mSv/h provided that:
    - (i) The *vehicle* is equipped with an enclosure that, during routine conditions of transport, prevents the access of unauthorized persons to the interior of the enclosure.
    - (ii) Provisions are made to secure the *package* or *overpack* so that its position within the *vehicle* enclosure remains fixed during routine conditions of transport..

Radiation Surveys

- Transport Vehicle Radiation Survey - *Exclusive use*
  - (iii) There is no loading or unloading during the *shipment*.
- (b) 2 mSv/h at any point on the outer surfaces of the *vehicle*, including the upper and lower surfaces, or, in the case of an open *vehicle*, at any point on the vertical planes projected from the outer edges of the *vehicle*, on the upper surface of the load, and on the lower external surface of the *vehicle*.
- (c) 0.1 mSv/h at any point 2 m from the vertical planes represented by the outer lateral surfaces of the *vehicle*, or, if the load is transported in an open *vehicle*, at any point 2 m from the vertical planes projected from the outer edges of the *vehicle*.

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Exercise at Repository

- Develop a packaging plan for a Category 4 source
  - The source used in the exercise will be determined based on sources available at the repository
  - If available the source will be Category 4
  - Using the Dose rate Estimate Excel Spreadsheet determine the optimum shielding for the source.
  - The packaging plan should include the configuration and thickness of the shielding (pig or container)

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Exercise

- The selected source should be moved from the repository to the StopBox.
  - Use good ALARA practices when moving the source